

# PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

<b>Date of mailing (day/month/year)</b> 02 May 2001 (02.05.01)		<b>To:</b> Commissioner US Department of Commerce United States Patent and Trademark Office, PCT 2011 South Clark Place Room CP2/5C24 Arlington, VA 22202 ETATS-UNIS D'AMERIQUE in its capacity as elected Office
<b>International application No.</b> PCT/GB00/03073	<b>Applicant's or agent's file reference</b> M99/0332/PCT	
<b>International filing date (day/month/year)</b> 09 August 2000 (09.08.00)	<b>Priority date (day/month/year)</b> 24 August 1999 (24.08.99)	
<b>Applicant</b> PEDGLEY, Owain, Francis et al		
1. The designated Office is hereby notified of its election made: <input checked="" type="checkbox"/> in the demand filed with the International Preliminary Examining Authority on: _____ <b>12 March 2001 (12.03.01)</b>  <input type="checkbox"/> in a notice effecting later election filed with the International Bureau on: _____		
2. The election <input checked="" type="checkbox"/> was <input type="checkbox"/> was not		
made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).		

The International Bureau of WIPO 34, chemin des Crêtes 1211 Geneva 20, Switzerland  Facsimile No.: (41-22) 740.14.35	Authorized officer Juan Cruz  Telephone No.: (41-22) 338.83.38
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## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference <b>M99/0332/PCT</b>	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. <b>PCT/GB 00/ 03073</b>	International filing date ( <i>day/month/year</i> ) <b>09/08/2000</b>	(Earliest) Priority Date ( <i>day/month/year</i> ) <b>24/08/1999</b>
Applicant <b>LOUGHBOROUGH UNIVERSITY INNOVATIONS LIMITED et al.</b>		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.  
 It is also accompanied by a copy of each prior art document cited in this report.

## 1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.
  - the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).
- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :
  - contained in the international application in written form.
  - filed together with the international application in computer readable form.
  - furnished subsequently to this Authority in written form.
  - furnished subsequently to this Authority in computer readable form.
  - the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
  - the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished
- 2.  **Certain claims were found unsearchable** (See Box I).
- 3.  **Unity of invention is lacking** (see Box II).
- 4. With regard to the **title**,
  - the text is approved as submitted by the applicant.
  - the text has been established by this Authority to read as follows:
- 5. With regard to the **abstract**,
  - the text is approved as submitted by the applicant.
  - the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.
- 6. The figure of the **drawings** to be published with the abstract is Figure No. 1
  - as suggested by the applicant.
  - because the applicant failed to suggest a figure.
  - because this figure better characterizes the invention.

None of the figures.

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
1 March 2001 (01.03.2001)

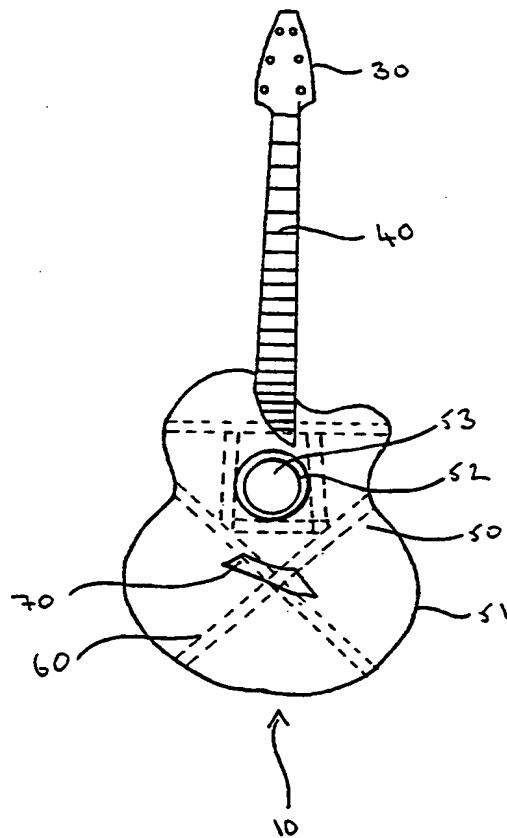
PCT

(10) International Publication Number  
**WO 01/15135 A1**

- (51) International Patent Classification<sup>7</sup>: G10D 1/00, 3/02, G10C 3/06
- (21) International Application Number: PCT/GB00/03073
- (22) International Filing Date: 9 August 2000 (09.08.2000)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
9919922.6 24 August 1999 (24.08.1999) GB
- (71) Applicant (for all designated States except US): LOUGHBOROUGH UNIVERSITY INNOVATIONS LIMITED [GB/GB]; Loughborough University, Ashby Road, Loughborough, Leicestershire LE11 3TF (GB).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): PEDGLEY, Owain, Francis [GB/GB]; 259 Providence Road, Walkley Bank, Sheffield, South Yorkshire S6 5BH (GB). ARMSTRONG, Robert, James [GB/GB]; 52 Stratford Street, Coventry, Warwickshire CV2 4NJ (GB). NORMAN, Edwin, William, Longley [GB/GB]; 16 Wightman Close, Shepshed, Leicestershire LE12 9NQ (GB).
- (74) Agent: MCNEIGHT & LAWRENCE; Regent House, Heaton Lane, Stockport, Cheshire SK4 1BS (GB).
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

[Continued on next page]

(54) Title: ACOUSTIC DEVICE



(57) Abstract: The present invention concerns acoustic devices, particularly musical instruments, having a new and improved soundboard formed from expanded polycarbonate, methods of manufacture of same, and the use of specific soundboards in the manufacture of acoustic devices.

WO 01/15135 A1



(84) **Designated States (regional):** ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

— Before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments.

**Published:**

— With international search report.

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## ACOUSTIC DEVICE

The present invention concerns acoustic devices, particularly musical instruments, having a new and improved soundboard, methods of manufacture of same, and the use of specific soundboards in the manufacture of acoustic devices.

For a long time it has been desired to produce acoustic devices, particularly musical instruments such as guitars, using soundboards constructed from synthetic polymers rather than wood as is traditionally done. Such devices would be relatively simple and inexpensive to manufacture and the production of devices having reproducible acoustic properties would be reduced from the complex skill-dependent job of an artisan to a controllable manufacturing process.

There have been many attempts to produce musical instruments having synthetic polymer-based soundboards, e.g. US 4353862, US 4364990, US 4429608, US 4969381, US 4873907, US 4188850, US 4185534, US 4213370, US 4290336, US 4334452, US 5469769, US 5804746 and US 4290336.

However, such instruments have typically suffered from the problem that they have been of a complex construction (for example with soundboards requiring carbon fibre or glass fibre reinforcements), are costly to manufacture, and have a sound quality not comparable to sound produced by instruments having the traditional wooden soundboard.

The present inventors have overcome the prior art disadvantages, producing musical instruments having polymer-based soundboards which are capable of producing sound of comparable quality to that produced by wooden soundboards. The materials

used are readily available and may be used to produce any desired acoustic device having a soundboard.

According to the present invention there is provided an acoustic device having a soundboard comprising expanded polycarbonate.

The expanded polycarbonate may be provided in the form of a sheet.

The soundboard may have a cellular rigid foam structure.

The soundboard may have a density of 500-700 kg/m<sup>3</sup>, for example 650 kg/m<sup>3</sup>.

The soundboard may have a tensile strength of about 20 MPa.

The soundboard may have a flexural strength of about 30 N/mm<sup>2</sup>.

One expanded polycarbonate material which is particularly useful is FOREX-EPC E 50.650 (Airex AG, Switzerland; SBA Ltd, Leicester, UK). It has a closed cell rigid foam structure, an apparent density (DIN 53479) of 650 kg/m<sup>3</sup>, a tensile strength (DIN 53455) of 20 MPa, elongation at break (DIN 53455) of at least 10%, an E-Modulus in tension (DIN 53457) of 1000 MPa and in flexure (DIN 53457) of 1200 MPa, a flexural strength (DIN 53452) of 30 N/mm<sup>2</sup>, is unbreakable on impact (DIN 53453), dimensional changes (DIN 16927) of ±0% at 120 minutes at 70°C, -0.5% at 75 minutes at 140°C (MD) and +0.4% at 75 minutes at 140°C (TD), and water absorption (DIN 53495) of less than 1% (W3-100°C 30 minutes).

Although it has previously been suggested in the art to use foams in the construction of e.g. guitars, it has never been suggested to use expanded polycarbonates.

For example, US 4185534 suggests using polystyrene and other homopolymers and copolymers derived from hydrocarbon vinyl monomer. Acoustic tests conducted by the inventors using an expanded PVC (Foamex - Airex AG, Switzerland; SBA Ltd, Leicester, UK) were found to produce a very "dull" sound which was unacceptable. Non-expanded polystyrene was also tested and found to produce a very "tinny" sound which was also unacceptable.

In certain of the prior art, the use of foams is disclosed but this is typically in the manufacture of solid-bodied instruments and not hollow-bodied ones having a soundboard.

It is typically found with traditional wooden instruments having a soundboard that they have "dead spots" or emit "wolf tones", which are particular frequencies that either respond very poorly or are much louder than the notes of other frequencies. This problem can be mitigated or avoided completely using the soundboards of the present invention.

The expanded polycarbonates used in the acoustic devices of the present invention have excellent acoustic properties allowing for the construction of e.g. stringed instruments such as guitars (see below) which have a quality of sound at least as good as instruments having wooden soundboards.

Naturally the exact acoustic properties of expanded polycarbonates will vary with e.g. their apparent density, tensile strength and flexural strength. Other factors such as the size of bubbles in the foam, either open or closed cells, as well as the gas or gases contained in the foam are also important. Nitrogen is typically used to expand the polycarbonate into the foam structure, but other gases may equally be used. For example, halogens such as argon, neon and helium. Other normally gaseous (under

normal atmospheric temperature and pressure) elements and compounds may also be used (subject to any undesired reactions with the polycarbonate) and will be readily apparent to one skilled in the art, for example as disclosed in e.g. US 4185534.

As well as forming the soundingboard of the acoustic device out of an expanded polycarbonate such as a polycarbonate sheet, the physical characteristics of the expanded polycarbonate may vary from point to point. For example, if the acoustic device is a guitar, the expanded polycarbonate soundboard may vary in thickness across its width or along its length. Similarly the size and/or density of bubbles may be varied.

The acoustic device may be a guitar as discussed above, or it may be any other musical instrument, particularly a stringed musical instrument, having a soundboard. For example, it may be a violin, mandolin, bass, lute, dulcimer, harp or piano.

The acoustic device may equally be any other device having a soundboard, for example devices requiring sound resonance (amplification) such as loudspeakers, drums or alarm systems.

The invention will be further apparent from the following description, with reference to the several figures of the accompanying drawings, which show, by way of example only, forms of guitar according to the present invention.

#### Of the Figures:

Figure 1 shows a front view of a first embodiment of a guitar;

Figure 2 shows a front view of a second embodiment of a guitar; and

Figure 3 shows a side view of the guitars in Figures 1 and 2.

Guitar 10 incorporating a soundboard according to the present invention has a general construction as shown in British Registered Designs Nos. 2074916 (guitar body) and 2074917 (guitar bridge).

Guitar 10 comprises a wooden neck 20, head 30 and fretboard 40. Soundboard 50 comprises FOREX-EPC E 50.650 having outer edge 51 and inner edge 52 defining sound-hole 53. Underside bracing of soundboard 50 is provided by a clear Lexan-polycarbonate brace 60.

Bridge 70 comprises Lexan. Sides 80 and back 90 comprise a single piece epoxy glass fibre moulding. Soundboard 50, brace 60, bridge 70 and sides 80/back 90 are bonded together using methylmethacrylate adhesive.

In a first embodiment of guitar 10 provided in Figure 1, a pattern construction for the main structural brace 60 is shown. Additional smaller braces (not shown) are used to distribute vibrations of the soundboard 50.

A second embodiment of the guitar 10 is provided in Figure 2. Here, brace 60 is in a slightly V-shaped pattern. The pattern of brace 60 according to this second embodiment may be more suited for production manufacture of guitar 10. In one variation (not shown) of the second embodiment, the pattern of brace 60 will be parallel rather than slightly V-shaped.

It will be appreciated that it is not intended to limit the invention to the above example only, many variations, such as might readily occur to one skilled in the art,

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being possible, without departing from the scope thereof as defined by the appended claims.

**CLAIMS**

1. An acoustic device having a soundboard comprising expanded polycarbonate.
2. An acoustic device according to claim 1, said soundboard comprising an expanded polycarbonate sheet.
3. An acoustic device according to either one of the preceding claims, said soundboard having a cellular rigid foam structure.
4. An acoustic device according to any one of the preceding claims, said soundboard having a density of 500-700 kg/m<sup>3</sup>.
5. An acoustic device according to claim 4, said soundboard having a density of 650 kg/m<sup>3</sup>.
6. An acoustic device according to any one of the preceding claims, said soundboard having a tensile strength of about 20 MPa.
7. An acoustic device according to any one of the preceding claims, said soundboard having a flexural strength of about 30 N/mm<sup>2</sup>.
8. An acoustic device according to claim 1, said soundboard comprising FOREX-EPC E 50.650.
9. An acoustic device according to any one of the preceding claims, comprising a musical instrument.

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10. An acoustic device according to claim 9, comprising a stringed musical instrument.

11. An acoustic device according to claim 10, comprising a stringed musical instrument selected from the group comprising guitar, violin, mandolin, base, lute, dulcimer, harp and piano.

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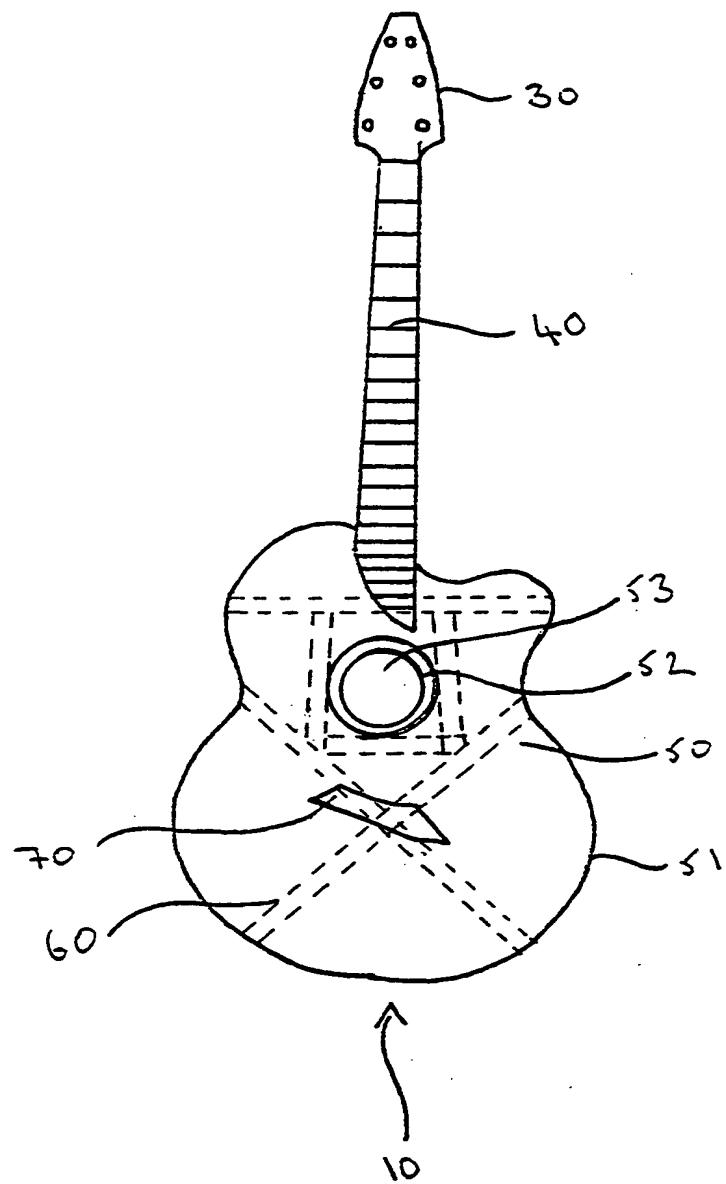


Figure 1

2 / 3

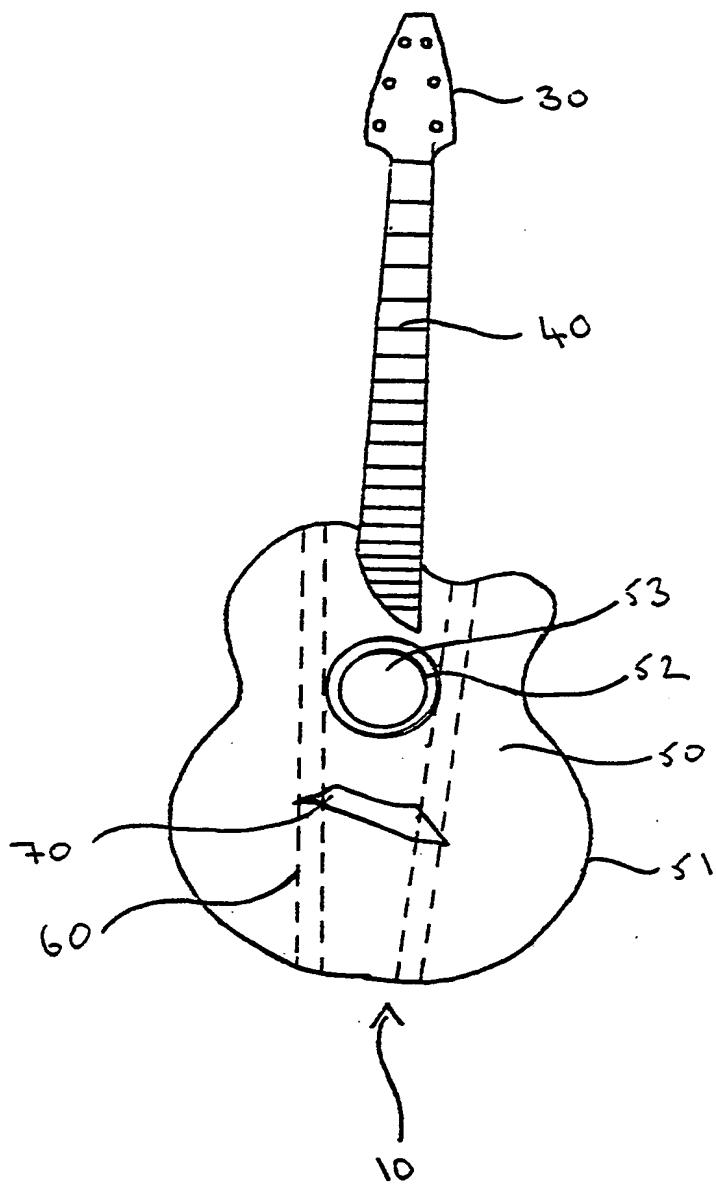


Figure 2

3 / 3

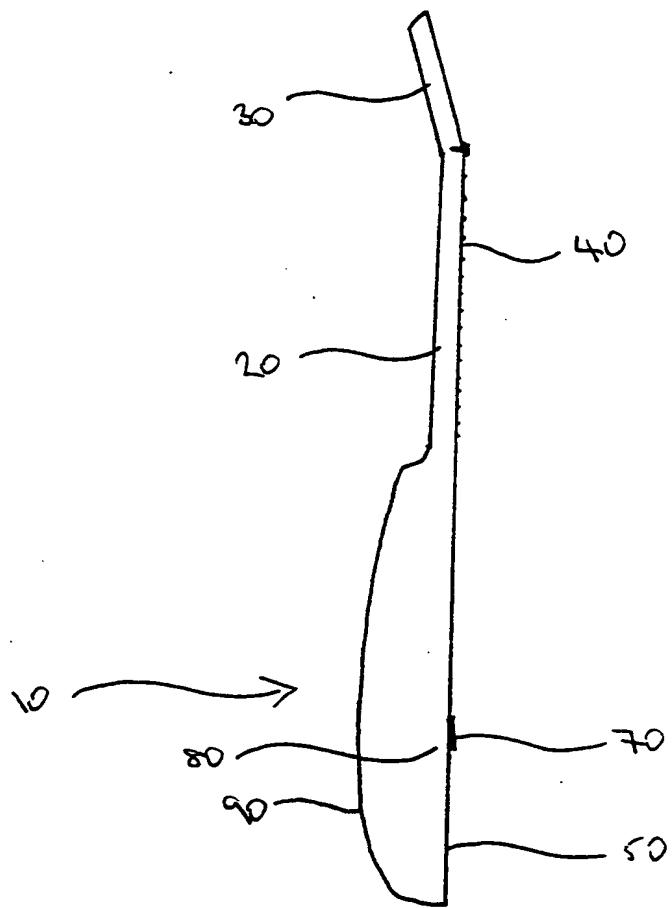


Figure 3

# INTERNATIONAL SEARCH REPORT

Internal Application No  
PCT/GB 00/03073

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 7 G10D1/00 G10D3/02 G10C3/06

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G10D G10C C08L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 0 604 079 A (GEN ELECTRIC) 29 June 1994 (1994-06-29) page 2, line 38 – line 39 page 10, line 22 page 10, line 19 ---	1-3, 9-11
A	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 07, 31 July 1997 (1997-07-31) & JP 09 076332 A (JSP CORP), 25 March 1997 (1997-03-25) abstract ---	1
A	WO 95 21442 A (BAAT CORNELIS JACOB JR DE) 10 August 1995 (1995-08-10) page 1, line 24,25 page 2, line 34 ---	1, 9-11
		-/-

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

\* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*&\* document member of the same patent family

Date of the actual completion of the international search

24 January 2001

Date of mailing of the international search report

31/01/2001

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.  
Fax (+31-70) 340-3016

Authorized officer

de Heering, Ph.

**INTERNATIONAL SEARCH REPORT**

Internal Application No

PCT/GB 00/03073

**C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 847 332 A (FARAONE ALEXANDER) 8 December 1998 (1998-12-08) ----	
A	US 5 441 997 A (WALSH EILEEN B ET AL) 15 August 1995 (1995-08-15) -----	

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/GB 00/03073

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
EP 0604079	A 29-06-1994	US 5346767 A		13-09-1994
		DE 69317533 D		23-04-1998
		DE 69317533 T		15-10-1998
		ES 2113501 T		01-05-1998
		JP 2634763 B		30-07-1997
		JP 6279661 A		04-10-1994
JP 09076332	A 25-03-1997	NONE		
WO 9521442	A 10-08-1995	NL 9400169 A		01-09-1995
		AU 1537895 A		21-08-1995
		EP 0744066 A		27-11-1996
US 5847332	A 08-12-1998	EP 0915637 A		12-05-1999
		JP 11205894 A		30-07-1999
		US 6026929 A		22-02-2000
US 5441997	A 15-08-1995	DE 69317534 D		23-04-1998
		DE 69317534 T		15-10-1998
		EP 0604080 A		29-06-1994
		ES 2114013 T		16-05-1998
		JP 10237282 A		08-09-1998
		JP 2813120 B		22-10-1998
		JP 6279665 A		04-10-1994

## PATENT COOPERATION TREATY

PCT

**NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES**

(PCT Rule 47.1(c), first sentence)

From the INTERNATIONAL BUREAU

To:

MCNEIGHT & LAWRENCE  
 Regent House  
 Heaton Lane  
 Stockport  
 Cheshire SK4 1BS  
 ROYAUME-UNI

Date of mailing (day/month/year) 01 March 2001 (01.03.01)
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Applicant's or agent's file reference M99/0332/PCT
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**IMPORTANT NOTICE**

International application No. PCT/GB00/03073	International filing date (day/month/year) 09 August 2000 (09.08.00)	Priority date (day/month/year) 24 August 1999 (24.08.99)
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Applicant LOUGHBOROUGH UNIVERSITY INNOVATIONS LIMITED et al
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- Notice is hereby given that the International Bureau has communicated, as provided in Article 20, the international application to the following designated Offices on the date indicated above as the date of mailing of this Notice:  
AU,KP,KR,US

In accordance with Rule 47.1(c), third sentence, those Offices will accept the present Notice as conclusive evidence that the communication of the international application has duly taken place on the date of mailing indicated above and no copy of the international application is required to be furnished by the applicant to the designated Office(s).

- The following designated Offices have waived the requirement for such a communication at this time:  
AE,AG,AL,AM,AP,AT,AZ,BA,BB,BG,BR,BY,BZ,CA,CH,CN,CR,CU,CZ,DE,DK,DM,DZ,EA,EE,EP,ES,  
FI,GB,GD,GE,GH,GM,HR,HU,ID,IL,IN,IS,JP,KE,KG,KZ,LC,LK,LR,LS,LT,LU,LV,MA,MD,MG,MK,  
MN,MW,MX,MZ,NO,NZ,OA,PL,PT,RO,RU,SD,SE,SG,SI,SK,SL,TJ,TM,TR,TT,TZ,UA,UG,UZ,VN,YU,  
The communication will be made to those Offices only upon their request. Furthermore, those Offices do not require the applicant to furnish a copy of the international application (Rule 49.1(a-bis)).
- Enclosed with this Notice is a copy of the international application as published by the International Bureau on  
01 March 2001 (01.03.01) under No. WO 01/15135

**REMINDER REGARDING CHAPTER II (Article 31(2)(a) and Rule 54.2)**

If the applicant wishes to postpone entry into the national phase until 30 months (or later in some Offices) from the priority date, a demand for international preliminary examination must be filed with the competent International Preliminary Examining Authority before the expiration of 19 months from the priority date.

It is the applicant's sole responsibility to monitor the 19-month time limit.

Note that only an applicant who is a national or resident of a PCT Contracting State which is bound by Chapter II has the right to file a demand for international preliminary examination.

**REMINDER REGARDING ENTRY INTO THE NATIONAL PHASE (Article 22 or 39(1))**

If the applicant wishes to proceed with the international application in the national phase, he must, within 20 months or 30 months, or later in some Offices, perform the acts referred to therein before each designated or elected Office.

For further important information on the time limits and acts to be performed for entering the national phase, see the Annex to Form PCT/IB/301 (Notification of Receipt of Record Copy) and Volume II of the PCT Applicant's Guide.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No. (41-22) 740.14.35	Authorized officer  J. Zahra  Telephone No. (41-22) 338.83.38
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**Continuation of Form PCT/IB/308**

**NOTICE INFORMING THE APPLICANT OF THE COMMUNICATION OF  
THE INTERNATIONAL APPLICATION TO THE DESIGNATED OFFICES**

Date of mailing (day/month/year) 01 March 2001 (01.03.01)	<b>IMPORTANT NOTICE</b>
Applicant's or agent's file reference M99/0332/PCT	International application No. PCT/GB00/03073

The applicant is hereby notified that, at the time of establishment of this Notice, the time limit under Rule 46.1 for making amendments under Article 19 has not yet expired and the International Bureau had received neither such amendments nor a declaration that the applicant does not wish to make amendments.

## ATENT COOPERATION TRE

PCT

**NOTIFICATION CONCERNING  
SUBMISSION OR TRANSMITTAL  
OF PRIORITY DOCUMENT**

(PCT Administrative Instructions, Section 411)

From the INTERNATIONAL BUREAU

To:

MCNEIGHT & LAWRENCE  
Regent House  
Heaton Lane  
Stockport  
Cheshire SK4 1BS  
ROYAUME-UNI

Date of mailing (day/month/year) <b>15 November 2000 (15.11.00)</b>	
Applicant's or agent's file reference <b>M99/0332/PCT</b>	<b>IMPORTANT NOTIFICATION</b>
International application No. <b>PCT/GB00/03073</b>	International filing date (day/month/year) <b>09 August 2000 (09.08.00)</b>
International publication date (day/month/year) <b>Not yet published</b>	Priority date (day/month/year) <b>24 August 1999 (24.08.99)</b>
Applicant <b>LOUGHBOROUGH UNIVERSITY INNOVATIONS LIMITED et al</b>	

1. The applicant is hereby notified of the date of receipt (except where the letters "NR" appear in the right-hand column) by the International Bureau of the priority document(s) relating to the earlier application(s) indicated below. Unless otherwise indicated by an asterisk appearing next to a date of receipt, or by the letters "NR", in the right-hand column, the priority document concerned was submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b).
2. This updates and replaces any previously issued notification concerning submission or transmittal of priority documents.
3. An asterisk(\*) appearing next to a date of receipt, in the right-hand column, denotes a priority document submitted or transmitted to the International Bureau but not in compliance with Rule 17.1(a) or (b). In such a case, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.
4. The letters "NR" appearing in the right-hand column denote a priority document which was not received by the International Bureau or which the applicant did not request the receiving Office to prepare and transmit to the International Bureau, as provided by Rule 17.1(a) or (b), respectively. In such a case, the attention of the applicant is directed to Rule 17.1(c) which provides that no designated Office may disregard the priority claim concerned before giving the applicant an opportunity, upon entry into the national phase, to furnish the priority document within a time limit which is reasonable under the circumstances.

<u>Priority date</u>	<u>Priority application No.</u>	<u>Country or regional Office or PCT receiving Office</u>	<u>Date of receipt of priority document</u>
24 Augu 1999 (24.08.99)	9919922.6	GB	27 Sept 2000 (27.09.00)

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No. (41-22) 740.14.35	Authorized officer  Carlos Naranjo  Telephone No. (41-22) 338.83.38
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# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference M99/0332/PCT	<b>FOR FURTHER ACTION</b>		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/GB00/03073	International filing date (day/month/year) 09/08/2000	Priority date (day/month/year) 24/08/1999	
International Patent Classification (IPC) or national classification and IPC G10D1/00			
Applicant LOUGHBOROUGH UNIVERSITY INNOVATIONS LIMITED et al.			

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I     Basis of the report
- II     Priority
- III     Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV     Lack of unity of invention
- V     Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI     Certain documents cited
- VII     Certain defects in the international application
- VIII     Certain observations on the international application

Date of submission of the demand 12/03/2001	Date of completion of this report 07.11.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer  de Heering, Ph.  Telephone No. +31 70 340 3604



# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03073

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

### Description, pages:

1-6                   as originally filed

### Claims, No.:

1-11                  as originally filed

### Drawings, sheets:

1/3-3/3              as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- the language of publication of the international application (under Rule 48.3(b)).
- the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- contained in the international application in written form.
- filed together with the international application in computer readable form.
- furnished subsequently to this Authority in written form.
- furnished subsequently to this Authority in computer readable form.
- The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- the description,        pages:
- the claims,           Nos.:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/GB00/03073

the drawings,      sheets:

5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)                  Yes: Claims 1-11

No: Claims

Inventive step (IS)           Yes: Claims 1-11

No: Claims

Industrial applicability (IA)   Yes: Claims 1-11

No: Claims

**2. Citations and explanations  
see separate sheet**

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:  
**see separate sheet**

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/03073

The examination is being carried out on the **following application documents:**

Text for the Contracting States:

AT BE CH DE DK ES FI FR GB GR IT IE LI LU MC NL PT SE

**Description, pages:**

1-6 as originally filed

**Claims, No.:**

1-11 as originally filed

**Drawings, sheets:**

1/3-3/3 as originally filed

- D1: EP-A-0 604 079 (GEN ELECTRIC) 29 June 1994 (1994-06-29)
- D2: PATENT ABSTRACTS OF JAPAN vol. 1997, no. 07, 31 July 1997 (1997-07-31) & JP 09 076332 A (JSP CORP), 25 March 1997 (1997-03-25)
- D3: WO 95 21442 A (BAAT CORNELIS JACOB JR DE) 10 August 1995 (1995-08-10)
- D4: US-A-5 847 332 (FARAONE ALEXANDER) 8 December 1998 (1998-12-08)
- D5: US-A-5 441 997 (WALSH EILEEN B ET AL) 15 August 1995 (1995-08-15)

1. The sole independant claim 1, is new and inventive w.r.t. the cited literature for the following reason:

Although D1 teaches the use of polycarbonate (see p.10, l.36) in the manufacture of acoustic devices (p.10, l. 34), nowhere in the prior art is it suggested that *expanded* polycarbonate should be used as the sound board of an acoustic device. In fact, the polycarbonate (containing) compositions taught in the cited art all have a different purpose and a different effect (anti-abrasion, sound absorption) from those contemplated in the instant application, having therefore fundamentally different

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

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International application No. PCT/GB00/03073

acoustic properties from those necessary in the manufacture of a sound board. In particular, the composition taught in D2 is concerned with "sound absorbing properties", therefore not part of the prior art which the skilled man would consider when manufacturing a sound board.

2. Dependant claims 2-11 are new and inventive because they contain the subject matter of Claim 1.

3. Claims 1-11 have industrial applicability (the manufacturing of a musical instrument).

4. Defects/observations:

4.1 To meet the requirements of Rule 6.3(b) PCT, the independent claims should be properly cast in the two part form, with those features which in combination are part of the prior art being placed in the preamble (see document D1).

4.2 Reference signs in parentheses should be inserted in the claims to increase their intelligibility; this applies to both the preamble and characterising portion (Rule 6.2(b) PCT).

4.3 To meet the requirements of Rule 5.1(a)(ii) PCT, document D1 should be identified in the description and the relevant background art disclosed therein should be briefly discussed.

## PATENT COOPERATION TREATY

PCT

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PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

## (PCT Article 36 and Rule 70)

Applicant's or agent's file reference M99/0332/PCT	<b>FOR FURTHER ACTION</b>		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/GB00/03073	International filing date (day/month/year) 09/08/2000	Priority date (day/month/year) 24/08/1999	
International Patent Classification (IPC) or national classification and IPC G10D1/00			
Applicant LOUGHBOROUGH UNIVERSITY INNOVATIONS LIMITED et al.			
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p><input type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of sheets.</p>			
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li>I <input checked="" type="checkbox"/> Basis of the report</li> <li>II <input type="checkbox"/> Priority</li> <li>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li>IV <input type="checkbox"/> Lack of unity of invention</li> <li>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li>VI <input type="checkbox"/> Certain documents cited</li> <li>VII <input checked="" type="checkbox"/> Certain defects in the international application</li> <li>VIII <input type="checkbox"/> Certain observations on the international application</li> </ul>			

Date of submission of the demand 12/03/2001	Date of completion of this report 07.11.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized officer  de Heering, Ph.  Telephone No. +31 70 340 3604



# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03073

## I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):  
**Description, pages:**

1-6                   as originally filed

### Claims, No.:

1-11                  as originally filed

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# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/03073

the drawings,      sheets:

5.  This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

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6. Additional observations, if necessary:

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

### 1. Statement

Novelty (N)                  Yes: Claims 1-11

No: Claims

Inventive step (IS)           Yes: Claims 1-11

No: Claims

Industrial applicability (IA)   Yes: Claims 1-11

No: Claims

### 2. Citations and explanations see separate sheet

## VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:  
see separate sheet

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/03073

The examination is being carried out on the **following application documents:**

Text for the Contracting States:

AT BE CH DE DK ES FI FR GB GR IT IE LI LU MC NL PT SE

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**Claims, No.:**

1-11 as originally filed

**Drawings, sheets:**

1/3-3/3 as originally filed

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- D3: WO 95 21442 A (BAAT CORNELIS JACOB JR DE) 10 August 1995 (1995-08-10)
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**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/03073

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